Written Testimony Presented to the
Committee on Government Reform
Subcommittee on National Security, Emerging Threats, and International Relations

at a hearing entitled
Examining VA Implementation of the Persian Gulf War Veterans Act of 1998

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November 15, 2005

I am Dr. Rogene Henderson, a Senior Scientist Emeritus at the Lovelace Respiratory Research Institute, an independent, not-for-profit research organization in Albuquerque, NM. I am a National Associate of the National Academies of Science.

I am testifying today concerning the value of animal research in improving our ability to assess association between exposure and health outcome in humans. In particular for this hearing, I am addressing the value of animal research in determining associations between exposures and health effects in Gulf War veterans..

Because we are concerned about health problems in humans, one might question why we need animal research. Why not treat the condition in humans symptomatically as best we can? The answer is that in some situations, as with veterans returning from war duty, the symptoms may be diverse and difficult to diagnose. Animal research allows us to determine the mechanisms by which the health problem might occur through conduct of controlled experiments that cannot be done in humans. If one knows the factors contributing to the development of the condition, one can then start to work on therapy or intervention techniques, and of equal importance for veterans, one may be able to prevent the problems from occurring in the future.

It is fair to ask whether animal responses correctly predict what would happen in humans. Animals have numerous anatomical, cellular, physiological and biochemical similarities with humans and we know a great deal about how to make allowances for known differences. There are striking similarities between the physiological systems of humans and various species of animals. Much of what we know about the immune system has come from studies with mice, and much of what we know about the cardiovascular system has come from studies with dogs. Virtually every medical breakthrough in the past century has come about as the result of research with animals. These include vaccines for polio, the use of insulin to treat diabetes, high blood pressure medicines, cataract surgery, hip replacement, kidney dialysis and cardiac bypass surgery to name a few.

Animal studies are now being used to assess possible associations between symptoms of Gulf War veterans and exposures to noxious agents. For example, the effects of exposure to low levels of nerve gas agents that do not cause obvious neurological symptoms are being studied. We all know what high levels of a nerve gas will do, but only recently have studies been completed to determine what low levels will do. In our laboratory we found that such low level exposures suppress the immune system (Kalra et al., 2002) and in the presence of high temperatures, results in alterations in areas of the brain that are involved in cognitive responses (Henderson et al., 2002) Moreover, the subclinical doses of sarin also affect neuroendocrine function and dramatically reduce serum cortisol levels.. In humans, lower serum cortisol levels are associated with symptoms seen in post-traumatic stress disorder, a condition found in many veterans. We are currently testing various therapeutic interventions for the neuroimmune effects of sarin exposure. Another set of experiments indicated that such combined exposures did not affect the thermoregulatory functions of the rat (Conn et al., 2002).

Work by Dr.Abou-Donia at Duke University has also shown that the combined treatment of rats with sarin and the chemical used as a counter measure to sarin (pyridostigmine) causes neural cell death (Abu-Qare and Abou-Donia, 2002). The rats recover but suffer lingering memory and cognitive deficits. These symptoms are similar to those reported by some veterans returning from the Gulf War and also in some survivors of the Japanese subway terrorist attacks. This line of animal research, which would be impossible to conduct in humans, is essential to provide information about potential health effects and approaches to treatment in veterans exposed under similar conditions. It would be a mistake to fail to conduct such research or to ignore its results.

Animal studies are also being used to evaluate the risks to veterans from depleted uranium fragments embedded in soft tissues or from inhaled dusts containing depleted uranium. These studies have shown that depleted uranium will concentrate in the kidneys and can cause kidney damage in rats after inhalation of high concentrations of depleted uranium dusts. DU may also concentrate in the brain but the effects of the low concentrations noted are still being studied. Embedded DU fragments of sufficient size have been found to cause local cancers in the muscles of rats. The results of these studies have been used to guide the medical management of wounded Gulf War veterans.

In any study on human health, information gained from human experience is the most useful. But when particularly puzzling health problems occur, animal studies are an excellent tool to help determine potential causes, effective therapeutic measures and potential preventative measures. In the case of the Gulf War veterans, human information has been considered, the human data have not been adequate to fully explain the symptoms in the veterans, and animal research has been conducted that provides clues to help clarify the situation. We are making good progress in determining the potential exposures that may be associated with the symptoms of the veterans. In determining these possible associations, we must consider the weight of evidence from all available sources of information, including human epidemiology studies, short-term clinical studies and animal studies. It would be irresponsible to do otherwise.

References:

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